

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of claims:

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Claim 1. (currently amended) A hydrorefining catalyst comprising a hydrogenation active metal component supported on a refractory porous carrier, wherein a median pore diameter determined by the nitrogen adsorption method is 8 to 20 nm, a pore volume determined by the nitrogen adsorption method is 0.56 - 1.0 cm³/g, and a pore volume of pores having a pore diameter of 50 nm or larger determined by the mercury intrusion porosimetry method is 0.32 - 1.1 cm³/g, wherein the pore volume of all pores determined by the mercury intrusion porosimetry method is 0.87 cm³/g or greater.

Claim 2. (canceled)

Claim 3. (original) A hydrorefining catalyst according to claim 1, wherein ^{the} catalyst is used in demetallizing or deasphalting of heavy oil.

Claim 4. (previously presented) A hydrorefining catalyst according to claim 1, wherein a pore volume of pores with a pore

diameter of not less than 1,000 nm measured by the mercury intrusion porosimetry method is not more than 0.2 cm³/g.

Claim 5. (previously presented) A hydrorefining catalyst according to claim 1, wherein ^{the catalyst having a} bulk density ^{is} 0.52 g/cm³ or less.

Claim 6. (previously presented) A hydrorefining catalyst according to claim 1, wherein the catalyst comprises 2 to 6 wt% molybdenum and 0.5 to 2 wt% nickel or cobalt as the hydrogenation active metal component.

Claim 7. (original) A hydrorefining catalyst according to claim 1, wherein the catalyst comprises 0.5 to 1.5 wt% ^{phosphorus} phosphorous or boron.

Claim 8. (original) A hydrorefining catalyst according to Claim 1, wherein the catalyst is molded by extrusion molding.

Claim 9. (currently amended) A hydrorefining catalyst according to claim 1, wherein an effective amount of a metal deposition is 70 g or more per 100 g of a fresh catalyst.

Claim 10. (original) A hydrorefining catalyst according to claim 1, wherein the catalyst is used for demetallization

treatment of heavy oil containing 45 ppm by weight or more of nickel or vanadium with respect to metal weight.

Claim 11. (original) A hydrorefining catalyst according to claim 1, wherein the catalyst is used for deasphalting treatment of heavy oil containing 3% or more asphaltene component.

Claim 12. (previously presented) A method of producing a hydrorefining catalyst comprising a hydrogenation active metal, comprising the steps of:

(1) kneading a porous starting powder whose main component is γ -alumina wherein the γ -alumina in the porous starting powder is present at 90 weight % or more and wherein the γ -alumina has a pore volume of $0.75 \text{ cm}^3/\text{g}$ or greater and a mean particle diameter of 10 to $200 \text{ }\mu\text{m}$ to prepare a kneaded product;

molding and calcining said kneaded product; and

supporting the active metal component on the kneaded product or on the kneaded product after calcining.

Claim 13. (original) A method of producing a hydrorefining catalyst according to claim 12, wherein the γ -alumina is γ -alumina that has been obtained by calcining boehmite powder.

Claim 14. (original) A method of producing a hydrotreating catalyst according to claim 13, wherein the molding is performed by extrusion molding.

Claim 15. (withdrawn - currently amended) A method of demetallizing or deasphaltizing a heavy oil: comprising contacting said heavy oil with a hydrotreating catalyst comprising a hydrogenation active metal component supported on a refractory porous carrier, ~~having a median pore diameter determined by the nitrogen adsorption method of 8 to 20 nm, a pore volume determined by the nitrogen adsorption method of 0.56 cm³/g or greater, with a pore volume of 0.32 cm³/g or greater for pores having a pore diameter of 50 nm or larger as determined by the mercury intrusion porosimetry method~~ wherein a median pore diameter determined by the nitrogen adsorption method is 8 to 20 nm, a pore volume determined by the nitrogen adsorption method is 0.56 - 1.0 cm³/g, and a pore volume of pores having a pore diameter of 50 nm or larger determined by the mercury intrusion porosimetry method is 0.32 - 1.1 cm³/g, wherein the pore volume ^{of all pores} determined by the mercury intrusion porosimetry method is 0.87 cm³/g or greater.

Claim 16. (withdrawn) A method of demetallizing a heavy oil according to claim 15: comprising contacting said heavy oil with a hydrorefining catalyst comprising a hydrogenation active metal component supported on a refractory porous carrier, having a median pore diameter determined by the nitrogen adsorption method of 8 to 20 nm, a pore volume determined by the nitrogen adsorption method of 0.56 cm³/g or greater, with a pore volume of 0.32 cm³/g or greater for pores having a pore diameter of 50 nm or larger as determined by the mercury intrusion porosimetry method, ↵

↵ wherein the heavy oil has 45 ppm by weight or more of nickel or vanadium with respect to metal weight.

Claim 17. (withdrawn) A method of deasphaltizing a heavy oil according to claim 15: comprising contacting said heavy oil with a hydrorefining catalyst comprising a hydrogenation active metal component supported on a refractory porous carrier, having a median pore diameter determined by the nitrogen adsorption method of 8 to 20 nm, a pore volume determined by the nitrogen adsorption method of 0.56 cm³/g or greater, with a pore volume of 0.32 cm³/g or greater for pores having a pore diameter of 50 nm or larger as determined by the mercury intrusion porosimetry method, ↵

↵ wherein the heavy oil contains 3% or more asphaltene.
